A STATEWIDE NEEDS ASSESSMENT STUDY OF CALIFORNIA'S CAREER-TECHNICAL EDUCATION PROGRAMS

California Department of Education

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Contents

I. Executive Summary

During the last 20 years, career-technical education (CTE) in California has been faced with numerous challenges, including a lack of sufficient resources, declining enrollments, and increasing emphasis on rigorous academic preparation, often at the expense of career-related courses. Despite these challenges, signs of support for CTE in California appear to be increasing. Specifically, the importance of career and technical courses and career preparation has been acknowledged in California's 2002 Master Plan, and recent legislation has been passed that will soon afford students the opportunity to enroll in CTE courses and also receive college credit for those courses. Moreover, Regional Occupational Centers and Programs (ROCPs) recently received a one-time equipment grant of $10 million.

Despite these positive signs, whether CTE has adequate resources—particularly equipment and facilities—to support effective programs in ROCPs and high schools is an issue that needs to be examined. Indeed, there is a widespread perception by CTE teachers and administrators in California that CTE equipment and facility needs are not being adequately met; however, there are little statewide data, if any, to support this perception.

To address this issue, the California Department of Education (CDE) awarded a contract to WestEd to conduct a study of equipment and facility needs. The study was intended to answer the following questions:

- How well are the equipment and facility needs currently being met in career-technical education programs in California?
- What equipment and facilities are needed so that career-technical education programs in California can effectively support industry standards?

WestEd addressed the research questions by asking CTE teachers and administrators across the state about the resources needed to operate programs that meet industry standards. Although program and geographic diversity was sought in the samples, population sampling was not pursued because a comprehensive data file of CTE teachers in California does not exist. Furthermore, neither the available project resources nor the tight project timeline allowed for the creation of such a database specifically for this project. Consequently, WestEd's approach was to identify as many CTE teachers and administrators from across the state as possible and solicit their participation in this study. In this way, WestEd hoped to identify the full range of CTE equipment and facility needs in California.

A decision was made to collect, analyze, and report data on the five broad CTE program areas that have traditionally been used in California: Agriculture Education, Business Education, Health Careers Education, Home Economics Careers and Technology, and Industrial and Technology Education. The decision to collect and report data at the program level rather than at the course level was made because analysis and reporting of results by course was deemed impractical due to the vast number and array of different CTE courses across the state, the lack of standardization of course titles, and substantial overlap in content between courses with different titles.

Various data collection methods were used in the study: surveys, interviews, and focus groups. Teacher surveys were conducted online and through regular mail. They were designed in collaboration with a Technical Advisory Committee (TAC) consisting of ROCP directors, CTE teacher association representatives, evaluation specialists, CTE specialists, and staff from the California Department of Education (CDE). Teachers' names and e-mail addresses were collected through various California teacher associations for the different career-technical areas and all 73 ROCPs. Notifications about the survey were also sent to all high school principals whose school has at least one CTE course. A total of 4,261 CTE teachers and 1,035 principals were identified. A total of 1,567 surveys were completed.

Information collected from surveys was supplemented by other sources. Focus groups and interviews were conducted to clarify survey findings, generate more detailed information about equipment and facility needs, and to determine cost estimates for the identified equipment and facility needs. The focus groups and interviews were conducted at various locations in California and consisted of CTE teachers, administrators, technology professionals, and school facility construction personnel.

What do the major findings from this study say about the status of CTE programs in California and current equipment and facility needs?

> **The general conclusion of this study is that California's CTE programs face widespread needs for equipment and facility upgrades to effectively prepare students for career entry and postsecondary opportunities.**

This conclusion is supported by the consistency of findings within and across program areas concerning the nature and extent of the equipment and facility needs. Although different program areas had different specific needs, the following common themes emerged across program areas:

- Teachers typically focus on the basics needed to maintain and run their classrooms and programs. They are not accustomed to asking for equipment and facilities that meet industry standards.
- CTE facilities are inadequate, and space for specialized facilities is at a premium.
- Computer equipment needs are widespread, and specialized computer hardware needs cannot be meaningfully distinguished from teachers' software needs.
- Rapidly changing technology makes it difficult, if not impossible, for equipment and facilities that meet industry standards to be acquired and maintained for CTE courses. Teachers acknowledge that a realistic goal for CTE courses is to provide students with exposure to the types of equipment and facilities they are likely to face in the industry.
- Teachers need and want ongoing professional development to understand current industry standards, to develop a better understanding of current industry-standard equipment, and to learn how to operate this equipment.
- Teachers need ongoing technical and computer support to make maximum use of new equipment.

- Teachers and administrators want more extensive and consistent equipment support from the business community.
- Because of concerns over statewide testing and issues of accountability, districts are increasing the number of remedial academic courses offered and reducing the number of electives and CTE courses. This reduction makes it difficult for CTE teachers to advocate additional equipment.
- Even within similar programs and courses, CTE facility and equipment needs vary widely. Many factors influence the cost of equipment and facilities (e.g., purchasing agreements, product quality, geographic location). Moreover, the diversity of local conditions makes it difficult to generalize and quantify equipment and facility needs beyond the local context. Funding approaches must take into account these differences in order to be effective.

Findings from this study suggest that equipment and facility needs must be addressed systematically in a comprehensive approach to CTE. Teachers' needs must be examined in relation to other issues with which they are intimately connected. For example, funding for equipment is combined with funds for instructional materials and course supplies; therefore, it is not really possible to consider equipment needs separately from those other expenses. In addition, staffing issues influence the kind and amount of equipment and facilities that are available to programs. Veteran CTE teachers report that they sometimes have access to equipment through relationships with businesses that they have fostered over the course of their careers. As these teachers retire, equipment needs may increase since new teachers need time to develop similar business relationships.

Although there is a pressing need for substantial resources for equipment and facilities, rethinking traditional facility configurations and delivery systems, as well as using new technologies that can supplant the need for costly equipment, should be incorporated into a comprehensive approach to supporting CTE programs in California. Addressing the equipment and facility needs of CTE programs will clearly require a thoughtful and multifaceted approach to funding that takes into account such issues as staffing, long-range planning, delivery systems, and instructional needs.

II. Introduction

Career-technical education (CTE) in California is again at a crossroads. After decades of programmatic expansion, beginning in 1980, many of the state's CTE courses and programs have been reduced or eliminated due to a lack of sufficient resources and decreasing enrollments. For example, over 75 percent of Industrial and Technology Education courses/programs have closed since the mid-1970s (Assembly Bill 1412, 2001). Moreover, the onslaught of state accountability legislation that began in the 1990s poses a further challenge to the status of CTE, as California's high school programs focus increasing attention on rigorous academic preparation, often at the expense of career-related and other elective courses. The finding of a recent national survey on state CTE funding practices showing that the comparative cost of CTE may be from 20 percent to 40 percent greater than that of academic instruction illustrates yet another challenge in the face of widespread budget shortfalls that states are experiencing (Klein 2001). Finally, the Bush administration's draft fiscal 2004 budget is yet another sign of the precarious environment for CTE across the nation. The proposed budget requests transferring Perkins funding from traditional CTE programs (e.g., tech-prep grants) to support a proposed new "Secondary and Technical Education" program. The proposed new program would shift the focus of Perkins funding from traditional vocational education to a new focus on supporting accountability and achievement objectives at the high school level and on providing technical education at the community college level (U.S. Department of Education 2003).

Despite these substantial challenges, there is recent evidence of a possible revitalization and resurgence of support in California for CTE. The *2001-2004 California State Plan for Vocational and Technical Education* (2001), developed by a joint committee of representatives from the state senate and assembly, features workforce preparation in its vision for California's educational system. Among its recommendations to the full legislature are the following:

> The State should establish a standard, academically rigorous curriculum for every high school student. This curriculum should make available career and technical courses, so that every student can be aware of, and prepared for, a full array of post-high school options. The State should provide the learning support necessary, including resources for career guidance and assistance, to enable students to successfully complete this postsecondary readiness curriculum. (Recommendation 11.1)
>
> State and local policy-makers should define adequate learning support in K-12 education as those resources and interventions necessary to meet the academic and career preparation needs of all students, ensure that all students attain the state academic standards, and which help all students who desire to do so meet college preparatory requirements and requirements for career success in the workplace. (Recommendation 14.1)

Consistent with the recommendations of California's Master Plan for Education, legislation was passed in September 2002 that allows for school districts to provide high school students with the opportunity to enroll in CTE courses and receive college credit for those courses. In concert, these two new laws (Assembly Bill 1412 and Senate Bill 1934) allow students to take CTE courses without risking their eligibility for college admissions. Another positive sign for CTE is the one-time equipment grant awarded in 2002 that distributed $10 million across California's regional occupational centers and programs (ROCPs).

Although these recent developments are very positive for CTE, the question of adequate resources — particularly equipment and facilities—to support CTE remains an issue. Indeed, there is a widespread perception by CTE teachers and administrators in California, as in many other states, that CTE equipment and facility needs are not being adequately met. For example, during testimony before a special hearing of the Joint Committee in 2001, CTE personnel stated that, "in many instances, these [CTE] programs are using World War II vintage equipment salvaged from state surplus facilities in California." Although this is a commonly shared perspective, little statewide data, if any, support or refute that statement.

To obtain statewide data on the current status of CTE programs in California and equipment and facilities necessary to support effective programs in ROCPs and high schools, the California Department of Education (CDE) awarded a contract to WestEd to conduct a study of these equipment and facility needs. The study sought to answer the following questions: How well are the equipment and facility needs currently being met in career-technical education programs in California? What equipment and facilities are needed so that career-technical education programs in California can effectively support industry standards? Statewide surveys, focus groups, and interviews were used to collect relevant data from CTE teachers and administrators in an attempt to answer these research questions. Such data will be useful to the state in overall planning and determining the kind of support that is needed by local CTE programs in California.

The remainder of this report presents the results of this study. Section III describes the methodology for the study. Section IV summarizes the results for five broad CTE programmatic areas: Agriculture Education, Business Education, Health Careers Education, Home Economics Careers and Technology, and Industrial and Technology Education. This is followed by a discussion of cross-program findings in Section V. Finally, Section VI presents the conclusions of the study.

III. Methodology

WestEd addressed the research questions by asking CTE administrators and teachers across the state about the resources needed to operate programs that meet industry standards. To capture the wide variety of California's CTE programs, teachers and administrators from diverse geographic locations and programs were approached to participate in the study.

The Sample

Although program and geographic diversity was sought in the teacher and administrator samples, WestEd did not pursue population sampling. For example, although a logical approach might involve creating a random or stratified sample of all CTE teachers in the state, this approach depends on the use of an existing, readily accessible, and comprehensive data file of CTE teachers in California. Unfortunately, a comprehensive file does not exist. Furthermore, neither the available project resources nor the tight project timeline allowed for the creation of such a database specifically for this project. Consequently, WestEd's approach was to identify as many CTE teachers and administrators from across the state as possible and solicit their participation in this study. In this way, the full range of CTE equipment and facility needs in California could be identified.

Three levels of analysis were considered to analyze and report statewide equipment and facility needs: (1) course-level data, (2) broad career area data, and (3) industry sector data. WestEd decided to collect and report data around the five broad career areas (option 2) that have traditionally been used in California: Agriculture Education, Business Education, Health Careers Education, Home Economics Careers and Technology, and Industrial and Technology Education. This decision was made for several reasons. First, analysis and reporting of results by course was deemed impractical due to the vast number and array of different career-technical courses across the state, the lack of standardization of course titles, and substantial overlap in content between courses with different titles. Second, the traditional broad career area groupings are recognizable to teachers. Third, although the state is moving toward defining career-technical courses around industry sectors, this is a new concept that has not yet been fully implemented. Thus, any discussion about equipment and facility upgrades needed by particular CTE industry sector programs to meet industry standards is premature at this point. Finally, there is a strong relationship between some of the newly defined industry sector areas and the traditional broad career areas (e.g., the Agriculture and Natural Resources industry sector and the Agriculture Education program). Thus, the study's findings may inform future decisions regarding equipment and facility needs for those sector areas that closely overlap with the current career program areas.

Although the "broad career area" was used as the primary level of analysis, WestEd also recognized that facility and equipment needs are often quite varied due to the array of courses within areas. For example, food service and child care courses require vastly different equipment and facilities even though both are under the umbrella of the Home Economics Careers and Technology program; therefore, the discussion of general program findings was supplemented with discussions of findings by specific clusters of courses within programs.

The following data collection techniques were used in the study:

- ***Surveys***—An online survey of California's career-technical teachers was used to reach the full range of career-technical education programs across the state.

- ***Focus Groups/Telephone Interviews***—Focus groups were conducted at various locations across California with career-technical education teachers and administrators to obtain more comprehensive and nuanced information than can be gleaned from a survey. Telephone interviews were conducted with teachers who were recruited for the focus groups but were unable to participate in person due to distance or other limitations.

Each data collection strategy is discussed in more detail below.

Teacher Surveys

The initial and primary data collection method was the teacher survey. It was intended to elicit information from CTE teachers about their facility and equipment needs and other related concerns. The survey window extended from May through August 2002, thereby allowing for recruitment of teachers during the school year and at program-specific statewide conferences.

The survey was offered online through the Internet. The online method was selected over a traditional paper-based survey because of its efficiency related to resources, data collection, and data entry. This approach was further justified by the large number of CTE teachers across the state who have e-mail accounts and Internet access. A paper-based version of the survey was made available for those who could not participate online.

The survey was developed in collaboration with key constituents who provided ideas at various points in the survey development process. For example, a Technical Advisory Committee was established to provide guidance to the project, consisting of ROCP directors, CTE teacher association representatives, evaluation specialists, CTE specialists, and CDE staff. The committee provided valuable suggestions about potential survey questions, teacher sampling, and methods for distributing the survey; committee members also provided feedback on the final survey draft. Facility planners also provided suggestions related to those questions that addressed facility needs. Finally, a select group of CTE teachers participated in a pilot test of the survey process. That is, WestEd sent the online survey to the pilot sample to get feedback about the survey questions and the survey administration process. This inclusive development approach ensured that survey questions were meaningful and that the online format was feasible (see Appendix A for a copy of the survey and results).

WestEd distributed the survey to as many teachers in the five CTE program areas as possible. In gathering teacher names and e-mail addresses, WestEd contacted various California teacher associations for the different career-technical areas and all 73 ROCPs in California. Furthermore, WestEd sent notifications announcing the survey to every California high school principal whose school had at least one career-technical course, as identified by California Basic Educational Data System (CBEDS) codes. Principals were asked to distribute the survey notification to CTE teachers at their schools. This approach resulted in a list of 4,261 CTE teachers and 1,035 principals.

Two methods were used to distribute the survey. First, the survey was distributed directly to CTE teachers either through e-mail or regular mail. WestEd e-mailed approximately 3,331 teachers (78 percent), inviting them to take the survey online. The remaining 930 teachers (22 percent) received a letter through regular mail; these teachers either did not have a known e-mail account or their ROCP wanted to distribute the survey information directly. These invitations included instructions about how the survey could be obtained on the Internet and, alternatively, how a paper-based version of the survey could be obtained and submitted. The second method used to contact teachers utilized high school principals. Principals were sent a notification (cover memo) from CDE introducing the study, as well as five copies of the survey notice for distribution to CTE teachers. Inevitably some teachers were notified of the study more than once (e.g., by e-mail, through their principal, or by their ROCP), but reaching as many teachers as possible seemed to outweigh any potential inconvenience to teachers. Upon request, WestEd provided teachers with a paper-based version of the survey and a postage-paid return envelope for returning the completed survey.

Several follow-up strategies were employed at various times during the survey window. First, WestEd sent a follow-up e-mail to teachers approximately two weeks after the original e-mail was sent. Principals received notification by e-mail or regular mail (if necessary) approximately three weeks after the original mailing, reminding them to distribute the survey notices to teachers. Another follow-up strategy included having teacher associations announce the survey to teachers at summer conferences. For example, the California Agriculture Teachers Association (CATA) distributed survey information at a statewide conference in June. This was considered a follow-up strategy because most of the conference participants had been contacted previously as part of the initial mailing.

These survey administration approaches resulted in 1,572 responses, including 1,420 online and 152 paper-based surveys. Teachers were asked to submit one survey for each type of career-technical course that they teach. Sometimes they teach different courses that require very different equipment and facilities. For example, a teacher who teaches three periods of construction and two periods of drafting was asked to complete two surveys while a teacher who teaches five periods of drafting was asked to submit only one survey.

Focus Groups/Telephone Interviews

When the survey was completed, WestEd conducted focus groups and telephone interviews with teachers and administrators. The purpose of the focus groups and interviews was to clarify survey findings, generate more detailed information about facility and equipment needs, and determine cost estimates for the identified equipment and facility needs. Specifically, focus group and interview sessions included questions about participants' backgrounds; the facility, computer equipment, and scientific/technical equipment needs; and the types of support participants receive from businesses (see Appendix B for a copy of the teacher and administrator questions).

The initial focus groups took place in September and October 2002 at various locations across the state and were intended to elicit additional information about equipment and facility needs. Focus groups were conducted in each of the ROCP regions (northern, central, coastal, and

southern). Six focus groups/telephone interviews were scheduled in each region, including one for each of the five CTE program areas and one for administrators.

Teacher Focus Groups/Telephone Interviews: WestEd recruited teachers for the focus groups on the basis of their response to a survey question about their willingness to participate in focus groups. Over 50 percent of survey respondents expressed interest in participating. However, the location and scheduling of the focus group sessions prohibited some teachers from participating. Focus groups were held in areas of each region in which large numbers of teachers agreed to participate in focus groups and/or in areas that are most accessible. The regions, however, are so vast that some participants who wanted to participate were not recruited because of the driving distance required.

Although WestEd planned to conduct 20 teacher focus groups (5 in each region), only 12 were actually conducted in person. The format for the remaining eight teacher focus groups was changed because of low teacher availability for some content and/or regional areas. In these cases, focus groups were replaced by telephone interviews. As a general rule, focus groups were conducted when four or more participants were able to meet. When groups had three or fewer participants, the session was conducted by telephone. A conference-calling service was used that allowed teachers to call in toll-free. The conference calls were conducted in much the same way as the focus groups, including use of the same questions (which were provided to participants prior to the call). Consequently, focus group and interview data are combined in the discussion below.

A total of 64 teachers participated in the focus groups and telephone interviews. The number of teachers for each area was as follows: 16 in Agriculture, 10 in Business, 7 in Health, 11 in Home Economics, and 20 in Industrial and Technology Education.

Administrator Focus Groups: At least one administrator focus group was conducted in each of the four regions. CTE "administrators" were defined as ROCP directors/superintendents or administrators of other district personnel who oversee CTE programs. Administrators were recruited by telephone and/or e-mail correspondence. The administrators were either contacted directly by WestEd or by a regional contact (e.g., Regional ROCP coordinator).

A total of 21 administrators participated in the five focus groups (two focus groups were conducted in the southern region). Administrators were not surveyed; therefore, these sessions were particularly important for obtaining administrators' thoughts on equipment and facility needs. Administrators were asked to comment on the status of equipment and facilities in relation to each of the broad career areas. They also were asked specific questions that related to the teacher survey results.

Besides the focus group/telephone interview sessions that were conducted to gather more information about specific equipment and facility needs, additional sessions were conducted to determine the cost estimates for the identified needs. Teachers, administrators, technology professionals, and school facility construction personnel participated in these sessions.

IV. Program Area-Specific Findings

This section presents the findings about facility and equipment needs for each of the five career program areas: Agriculture Education, Business Education, Health Careers and Technology, Home Economics Careers and Technology, and Industrial and Technology Education. As outlined in the methodology section, these findings are based on the survey and focus group/telephone interview data. Table 1 shows the number of survey responses submitted for each career program area.

Table 1. Survey Responses by CTE Program Area

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Each discussion of findings about a CTE program area is organized as follows:

- Sample/Background Information—the types of career clusters/courses within each program area and the types of clusters/courses represented by survey and focus group/telephone interview participants
- Scientific/Technical Equipment Needs—information about the quality of scientific/technical equipment in relation to industry standards[1] (*Note*: scientific/technical equipment does not include computer equipment.)
- Computer Equipment Needs—information about the quality of computer equipment in relation to industry standards (*Note*: computer equipment does not include software.)
- Facility Needs—information about the quality of facilities (e.g., building and space) in relation to industry standards

The discussion below outlines the specific scientific/technical equipment, computer equipment, and facility needs for the five CTE program areas. The estimated costs associated with the identified facility and equipment needs are included in Appendixes C through E.

[1] A major focus of the study was to determine facility and equipment needs in relation to industry standards. For the purposes of this study, "industry standard" is defined as having the equipment and facilities necessary to effectively prepare students for entry-level employment and/or postsecondary education in a career-technical area.

IVa. Agriculture Education

As Table 1 indicates, 13 percent (N=207) of survey respondents teach agricultural courses. The Agriculture Education program area includes a range of courses and occupational clusters:

- Crop and Soil Science
- Animal Science
- Mechanics and Engineering Technology
- Business Management and Marketing
- Horticulture and the Environment
- Forestry, Natural Resources, and Rural Recreation
- Basic Agriculture (first year)
- Basic Agriculture (second year)

(*California Department of Education and Stanislaus County Office of Education 2000*)

The survey respondents reflected the range of cluster areas in agriculture. The most frequently mentioned courses that respondents reported teaching are:

- Mechanics and Engineering Technology (22 percent of agriculture teacher respondents)
- First Year Basic Agriculture (17 percent)
- Horticulture and the Environment (16 percent)
- Animal Science (8 percent)
- Second Year Basic Agriculture (8 percent)
- Business Management and Marketing (5 percent)
- Forestry, Natural Resources, and Rural Recreation (1 percent)

Focus group participants also reported teaching the courses noted above.

Agriculture Education Scientific/Technical Equipment Needs

Excluding computer equipment, the scientific/technical equipment category includes all other equipment associated with the agriculture programs. The recent trend is for agriculture programs to become more science oriented. This trend is fueled by the increasing sophistication of technologies in the field and by pressure to make agriculture classes eligible for academic credit. The agriculture scientific/technical equipment needs reflect this trend. As shown in Table 2, the survey data indicated that about half of the agriculture teachers believe that their scientific/technical equipment meets or almost meets industry standards. An equal proportion, however, indicated that their equipment falls short or falls very short of industry standards.

Table 2. The Degree to Which Scientific/Technical Equipment Meets Industry Standards

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Table 3 below indicates the types of equipment cited most frequently by agriculture teachers as needed to meet industry standards.

Table 3. Scientific/Technical Equipment Needs

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As suggested by the wide variety of equipment identified by teachers in Table 3, Agriculture Education programs are not homogeneous. Agriculture mechanics, animal science, and horticultural programs, although all grouped under the Agriculture Education program, are very different disciplines. For example, many specific needs cited by the teachers relate directly to horticulture programs (e.g., floral equipment, greenhouses, and related equipment, as well as landscape and garden tools); other frequently cited types of equipment, such as welding equipment, shop tools, heavy equipment, and small engines, reflect the needs of the agriculture mechanics programs.

Table 3 clearly shows that science equipment (e.g, the kinds of equipment normally associated with a biology or chemistry lab) accounts for a large proportion of the equipment that the surveyed agriculture teachers said that they needed. *Laboratory equipment* (e.g., glassware, dissecting kits, scales), *testing equipment* (e.g., pH meters, moisture meters, water and soil testing kits), and *microscopes* are three of the top four most-often-cited categories of needed equipment. Although asked to exclude computer equipment from consideration as scientific/technical equipment, survey respondents still frequently cited computers as a need. This response shows the importance of computer equipment to teachers (as discussed in the next section).

Generally, the teachers in the focus groups endorsed the needs cited by the teachers in the survey. Most believe that the needs identified in the survey are real and typical of many agriculture programs. However, they cautioned that levels of sophistication can exist within any of these categories of equipment. For example, agriculture programs require several kinds of microscopes: low-end, inexpensive scopes to introduce students to the basics of microscope use; moderately sophisticated scopes for serious study and projects; and high-end electron microscopes, which represent industry standards in veterinary medicine. The teachers believe that meeting industry standards, if understood as obtaining the high-end equipment used in industry, is an unrealistic goal.

The focus group teachers also raised several other equipment-related issues:

- **Consumables:** Although consumables are not normally considered equipment, the distinction between what is equipment and what is a consumable is blurred. Often the needs are for chemicals, test strips, or materials rather than for hardware equipment. Equipment cannot be considered apart from the need for supplies and consumables because there is only a single source of funding for both.

- **Textbooks and instructional materials:** A somewhat surprising finding is that the issue of acquiring textbooks and instructional materials was repeatedly raised in response to equipment needs. Again, because agriculture teachers must balance their equipment needs with their needs for textbooks and instructional materials, teachers did not see these as distinct program needs. Focus group teachers frequently cited the difficulty of obtaining textbooks. They also indicated that even when textbooks are available, they still have to produce workbook materials. The cost of securing or producing instructional materials directly reduces the funds they have available for equipment repair or replacement.
- **Repair and replacement:** Focus group teachers reported that no policies are in effect to replace equipment regularly and that they either have to repair their own equipment or pay for equipment repairs from their instructional budgets.
- **Vehicles:** Focus group teachers also cited vehicles as a pressing need for many agriculture programs. Not only are vehicles, such as pick-up trucks, necessary for farm projects, vans are also necessary for taking students to leadership events and project competitions. Administrators also stressed the critical need for vehicles.

Additional Perspectives on Agriculture Scientific/Technical Equipment Requirements

The needs of agriculture programs for scientific/technical equipment are changing. As noted above, agriculture programs are moving toward a more science-based orientation. Although this shift is in part a result of curriculum-related policies, the change is also a response to technology advances in the agriculture industry. Most agriculture programs are starting to see an increased emphasis in biotechnology (including a stronger focus on genetics, Global Positioning Systems [GPS], computerized irrigation systems, etc.). Students are eager to learn about doing this type of work because it is innovative and because it provides good-paying job opportunities. Both teachers and administrators feel that programs and their scientific/technical equipment need to reflect these changes.

Agriculture Education Computer Equipment Needs

Table 4 indicates the degree to which agriculture teachers feel that their current computer equipment needs meet industry standards. The results of the survey data indicate that 18 percent of the respondents believe their computer equipment fully meets industry standards.

Table 4. The Degree to Which Computer Equipment Meets Industry Standards

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There is a slight discrepancy between the percentage of teachers who say that their computer equipment fully meets industry standards (18 percent) and the percentage of respondents who say that they do not need any additional computer equipment (8 percent).[2] This discrepancy suggests that the data in Table 4 may somewhat understate the needs for computer equipment.

When asked to identify their most pressing computer equipment needs, teachers most frequently identified computers (62 percent). Table 5 shows the computer equipment most frequently identified by teachers as necessary to meet industry standards.

Table 5. Additional Computer Equipment Needed to Meet Industry Standards

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Focus group participants agreed that having the equipment outlined above is generally important in meeting industry standards. They brought up the following issues related to computer equipment:

- **Outdated computers:** Agriculture teachers who participated in the focus groups agreed that they needed more computers. At least of equal concern, however, was that much of their existing equipment was outdated and needed to be upgraded. Teachers reported that outdated computers are often unable to run current instructional software.
- **Access to existing computers:** Some teachers indicated that even though computer labs are available on campus, access to computers is an issue. Classes for agriculture programs are often remote from computer labs; therefore, getting students access to those labs is sometimes impractical.
- **Low priority for computer equipment:** Agriculture teachers believe that their programs have a low priority for receiving computer equipment compared with academic programs that have first call on obtaining or upgrading computer equipment. Although the agriculture teachers are proud of their resourcefulness, they are also somewhat frustrated that they often have to "fight for their fair share" of computer resources.

[2] Teacher responses to the questions about the degree to which their equipment and facilities meet industry standards suggests that their equipment and facilities are generally sufficient. However, when asked further in both survey and focus group/interview questions about their specific needs, teachers expressed a more pronounced need for equipment and facilities upgrades. There are several possible explanations for this discrepancy. First, the discrepancy may be due to the way in which these questions were presented in the survey. Teachers were initially asked about the degree to which their equipment and facilities meet industry standards. In subsequent questions, however, they were presented with either a list of possible facility or equipment upgrades or opportunities to list specific needs. This list of options may have stimulated their thinking and resulted in a more comprehensive perspective on the equipment and facilities that are needed in their programs. The survey structure did not permit the teachers revisiting the initial question and revising their estimate of the degree to which their equipment and facilities meet industry standards. Second, CTE teachers are very creative with what they have; they are tireless advocates for their programs. As a result, teachers may suggest their courses meet industry standards, regardless of their facility conditions or types of equipment. Finally, many districts and ROCPs have benefited from recent technology and equipment-related funding—the Digital High School Grant and the one-time equipment grant. Although these funds are limited and were not intended to cover all costs associated with equipment needs, the CTE teachers who benefited from the funds may be more likely to suggest that their equipment and facilities are adequate.

- **Lack of a replacement policy:** None of the agriculture teachers reported having a replacement policy in the program. Many businesses, organizations, and institutions recognize that computer equipment is changing rapidly and that upgrading on a regular basis needs to be built into the planning and budgeting processes. However, many of the agriculture teachers who had received recent computer equipment upgrades are concerned that the upgrades were a one-time only occurrence. Because there is no plan to replace computers on a regular basis, they are concerned that they will again fall behind industry standards.
- **Lack of maintenance support**: Few agriculture teachers reported that maintenance support was available for their computer equipment. When computer equipment fails, the only options available to the teachers are self-help or using funds intended for other instructional purposes. Often, failed equipment simply cannot be used because the means for repairing it do not exist.
- **LCD projectors:** Although LCD projectors were not offered as a survey choice, teachers stressed the need for this equipment. Teachers believe that LCD projectors are important tools for keeping programs up to industry standards and that projectors are effective not only in presenting instructional material, but that they could be used sometimes to reduce the number of computers and other equipment needed in a classroom. Using one computer with a projector to present a lesson could be more cost-effective than furnishing each student with a computer. In addition, projectors could be used to introduce students to industry-standard equipment and techniques that are simply too expensive or too complex to bring into a classroom.
- **Laptop computers:** Both teachers and administrators expressed a need for laptop computers. The portability of laptop computers makes them ideal for use in the field, which is important in many agriculture applications. Laptop computers may also be a partial solution to crowded classrooms, which do not have the space to accommodate desktop workstations.

Agriculture Education Facility Needs

The data from surveys and focus groups/telephone interviews suggest that agriculture teachers need facility upgrades to meet industry standards. The extent of the needs and the type of specific upgrades needed vary with the type of program and the geographic area in the state. Table 6 indicates the degree to which the agriculture teacher survey respondents believe that their current facilities meet industry standards. As shown, 16 percent think that their facilities fully meet industry standards, while 38 percent think that their facilities almost meet industry standards.

Table 6. The Degree to Which Facilities Meet Industry Standards

Table 6 removed to reduce the size of file.

However, when asked to identify specific facility needs, only 9 percent of the teachers indicated that no upgrades are necessary, while 91 percent identified some specific facility need. This result suggests that facility needs are more extensive than indicated by responses to the previous question on the degree to which existing facilities meet industry standards.

Table 7 highlights those facility upgrades (either repairs or installation) that were most frequently cited by the survey respondents as needed to meet industry standards.

Table 7. Facility Upgrades Needed to Meet Industry Standards

Table 7 removed to reduce the size of file.

The teacher and administrator focus group data strongly supported the facility needs identified by the survey data. When presented with the data in Table 7, the focus group teachers and administrators verified that those facility issues were indeed important and representative of the needs throughout the state.

Nearly all the focus group teachers agreed that their most pressing and widespread facility need was for appropriate space. Although almost a third (29 percent) of the survey respondents signified a need for "square footage for facilities," most of the focus group teachers clarified that the need was not only for more space, but also for space that is appropriate for its intended use. Specifically, the focus group teachers cited the need for classroom space, shop space, laboratory space, and storage space. In all the focus groups, teachers stressed that classrooms, shops, and laboratories are not interchangeable.

- **Classroom space**: Teachers frequently noted the need for basic academic classrooms. Often this need arose from situations in which teachers were asked to use single-purpose space for multiple purposes. Teachers frequently mentioned the need to teach the academic component of a course in a shop or laboratory rather than in a standard classroom. Many of the agriculture classes require instruction from textbooks, lectures, slides, or chalkboards. These traditional instructional techniques are difficult to perform in a shop or lab environment. Several teachers emphasized, "Oil and textbooks just do not mix."

- **Shop space**: Teachers noted that existing shop facilities are very outdated. Many have not been upgraded to keep pace with either industry standards or modern building codes. Agriculture mechanics and welding classes need shops with functional ventilation systems. Adequate electrical power supply is also an issue for meeting industry standards. Shop equipment often requires special wiring and heavy-duty power sources that do not exist in many shops. In addition, focus group teachers reported that the shortage of shop space is often exacerbated by requirements to use shop space for standard classroom instruction. They stressed the extreme impracticability of classroom instruction in a shop environment. Administrators cited these same shop-related needs (electrical supply, ventilation, heating, and air conditioning) as critical issues in adequately equipping shops.

  Administrators saw these shop-related needs not only as facility needs per se, but also as safety and liability issues.

- **Laboratory space**: The recent trend is for agriculture programs to be more and more science oriented. This trend is fueled both by the increasing sophistication of technologies in the field and by pressure to make agriculture classes eligible for academic credit. The laboratory facilities available for agriculture classes have not kept pace with this development. Few programs have sufficient laboratories needed for teaching even basic science classes. The basic needs in this area are typical science (biology/chemistry) labs. Lab workstations need to have chemical-resistant countertops with sinks and proper disposal systems. The workstations need to be equipped with water, gas, and electrical supplies. Storage areas for science equipment and hazardous chemicals are also required.

- **Storage space**: Focus group teachers also emphasized the need for storage space. The kinds of projects that can be undertaken are restricted because of inadequate storage space when they are completed. There is also inadequate space to store and secure equipment and supplies. This need is directly linked to equipment issues because lack of storage space often results in damage to, and subsequent loss of, equipment. Focus group administrators also considered storage space a critical need.

- **Computer workstation space**: Space to set up a computer workstation is an important need cited by teachers in both the survey and the focus groups. Although the lack of physical workstations is often a problem, the teachers emphasized that this problem is also a space issue. Many teachers said that even if they had the computers and the furniture they needed, they would still have no place to put them. They believed that inadequate space and/or planning allowed the loading of computers into spaces that had no workstations to house them. Limited access to computers and to needed classroom space was the result.

Focus group teachers reported that the lack of adequate space is an increasing problem because facilities are often lost to other programs. This is especially true of shop and storage space, which had been converted to wrestling rooms, dance studios, and other nonagriculture facilities. Administrators confirmed that, in general, high schools are trying to eliminate or reduce agriculture programs in order to use the space for other programs. The administrators also cited cases where programs had been completely eliminated and facilities converted to other uses. They stressed the extreme inefficiency, impracticability, and high cost of restarting programs when the facilities have to be rebuilt from scratch.

Another facility need expressed by the focus group teachers is the need for usable land. As land becomes more valuable and scarce, agriculture programs have lost land to other uses, most often to erect classrooms and develop parking lots. The specific needs depend on the occupational cluster and the geographic area in which the program is located. Horticulture programs need land for greenhouses and landscape and gardening projects, and animal programs need land for livestock-raising projects. The pressure to convert agriculture land to other uses is most acute in areas that are becoming increasingly urban. Administrators confirmed that physical land is a critical need. The administrators see the need for land as especially acute in the San Francisco Bay Area.

IVb. Business Education

Business Education Sample/Background Information

Table 1 indicates that 29 percent of all survey respondents (N=446) teach Business Education courses. The Business Education program area includes the following career-path clusters:

- Business Core
- Accounting and Finance
- Business Management
- Computer Science and Information Technology
- Marketing
- Entrepreneurship

Business Education encompasses a broad range of courses (e.g., financial services to telecommunications). Similarly, survey respondents represent a variety of business courses. The most frequently mentioned courses that survey participants reported teaching are:

- Computer Operations/Computer Science (16 percent of teachers)
- Keyboarding (typing) (11 percent)
- Accounting/Computer Accounting (10 percent)
- General Office Occupations (7 percent)
- Business Technology (6 percent)
- Word Processing Occupations (5 percent)
- Small Business Ownership and Management (4 percent)
- Information Processing (4 percent)

In addition to the courses listed above, the teachers and administrators who participated in the focus groups/telephone interviews represent the following courses: Computer Graphics, Computer Programming, International Business, MS Office, Cisco Certification, Retail and Sales, and Virtual Enterprise.

Business Education Scientific/Technical Equipment Needs

Besides computer equipment, scientific/technical equipment refers to all other equipment associated with business programs. Because many business programs rely heavily on computer equipment, business teachers were less likely to distinguish between computer equipment and scientific/technical equipment. Much of the survey and the focus group/interview data blurred these lines as well; in fact, responses to the question about scientific/technical equipment tended to focus on computer-related equipment. Moreover, a significant number of teachers (58 percent) either checked "do not know" or did not respond when asked to indicate the degree to which their current scientific/technical equipment meets industry standards, as shown in Table 8. Of the business teachers who did respond, 24 percent believe that their equipment meets industry standards, while 12 percent believe their equipment almost meets industry standards.

Table 8. The Degree to Which Scientific/Technical Equipment Meets Industry Standards

Table 8 removed to reduce the size of file.

Table 9 shows the additional scientific/technical equipment necessary to meet industry standards as indicated by survey respondents. The list contains many types of computer equipment.

Table 9. Scientific/Technical Equipment Needs

Table 9 removed to reduce the size of file.

As noted above, focus group participants agreed that computer-related equipment is necessary for meeting industry standards. They also agreed that office equipment, video cameras, televisions, and CD burners are important pieces of equipment in meeting industry standards. At least two of the groups strongly supported the need for more office equipment. One teacher pointed out that in order to teach basic office skills, one needs fax machines, copiers, and telephones. She noted that students need hands-on experience with this equipment to function effectively in an office environment.

Business Education Computer Equipment Needs

As shown in Table 10, 44 percent of business teachers believe their computer equipment meets industry standards, and 35 percent agree that their computer equipment almost meets industry standards.

Table 10. The Degree to Which Computer Equipment Meets Industry Standards

Table 10 removed to reduce the size of file.

In contrast to the 44 percent of respondents who believe their needs are fully met, only 31 percent responded "none" when asked to identify specific computer equipment needs (see footnote 2 for a discussion about this apparent discrepancy). The 69 percent who reported that they have additional needs identified computers (and peripherals) most frequently, as indicated in Table 11.

Table 11. Additional Computer Equipment Needed to Meet Industry Standards

Table 11 removed to reduce the size of file.

The focus group/telephone interview participants believe that the need for computer equipment is more pronounced than indicated by the survey findings. They expressed a need to upgrade their current computer stock. Although most business programs have a substantial number of computers, many of these are outdated and cannot support current software programs. Participants also mentioned the need for additional funding to support ongoing maintenance, as well as the more specific need of LCD projectors and related equipment. These are discussed in more detail below.

- **Upgrade hardware equipment to support software:** Familiarity with and ability to use different software programs is an essential indicator of meeting business industry standards. Hardware needs to be suitable to run different software programs. However, as one teacher commented about the status of computers in his program, "Computer hardware is often not capable of handling newer software." Another teacher commented that her class is currently using 486 PCs, which crash often and cannot run the necessary software for her class—Microsoft Access and Excel. Moreover, participants reported that there is no replacement policy in place at most sites and therefore programs continue to use equipment that is no longer used in the industry, particularly in Information Technology programs.

- **Funding for ongoing maintenance:** Participants expressed a need for adequate funding to support computer equipment repair and ongoing technical support. Although new equipment is important, making sure that the current equipment runs effectively is equally important. Participants believe that the life span of computer equipment is maximized if it is well maintained.

- **Projection equipment (e.g., LCD projectors):** This equipment was mentioned in every administrator and teacher focus group/telephone interview. As one administrator commented, "Whereas five years ago LCD projectors were 'nice to have,' now they are required. They are essential for meeting the standards." This equipment is considered essential for both instructional purposes and providing students with the appropriate presentation media so that they can hone their presentation skills (which is an important skill in any business career). Participants talked about needing all the related equipment, including screens and bulbs, as well. Although these systems are expensive, administrators believe that they are fast becoming the standard in instructional media.

Business Education Facility Needs

Table 12 indicates the degree to which teacher survey respondents believe their current facilities meet industry standards. As shown, 46 percent believe their facilities meet industry standards, and 36 percent believe their facilities almost meet industry standards.

Table 12. The Degree to Which Facilities Meet Industry Standards

Table 12 removed to reduce the size of file.

However, when asked to identify specific facility needs, only 31 percent of respondents selected "No upgrades are needed," and 69 percent identified some specific facility need (see footnote 2 for a discussion about the apparent discrepancy).

Table 13 highlights those facility upgrades (either repairs and/or installation) most frequently identified as being necessary to meeting industry standards. The most frequently identified need, "ergonomically designed furniture," was also identified in discussions and survey responses related to computer equipment and scientific/technical equipment. This is not surprising because ergonomics covers, among other things, furniture style and location, electrical outlet

locations/modifications, computer equipment (e.g., keyboard, mouse), and lighting, all of which are important in the day-to-day operations of most business courses.

Table 13. Facility Upgrades Needed to Meet Industry Standards

Table 13 removed to reduce the size of file.

The teacher and administrator focus groups/telephone interviews supported the facility needs that were identified by survey respondents. In particular, participants highlighted the fact that most business classrooms are not designed to house computers and other related equipment. Focus group participants also agreed with survey responses on the need for more space (i.e., square footage). Specific details related to these facility needs are described in more detail below.

- **Ergonomically designed furniture/equipment**: More than any other CTE program, Businesses Education programs rely on computers and related equipment. As a result, teachers and administrators agreed that ergonomically designed furniture and equipment are essential to ensure safety and overall ease of equipment use. Many programs are not currently equipped to handle the computer equipment. For example, one teacher commented that tables in the computer lab do not have openings for cables and wiring; therefore, students are forced to negotiate the wiring that flows to the floor. In another case, a teacher commented that her "tables bow in the middle" from the weight of the computers. Clearly, much of the outdated furniture used by business courses is not suitable for the current amount and types of computer equipment.
- **Increased facility space:** Focus group/interview participants strongly agreed that business programs need more space; every administrator and teacher group stressed the importance of having more space. Many business courses are housed in rooms that were not originally designed to house computers and other equipment. For example, one teacher mentioned that despite efforts to modernize her computer lab space, the retrofits were not sufficient to accommodate the 40 computer stations and the students who use them. More space is needed for storage of equipment and a network server. Space is also needed to provide instructional opportunities (e.g., class presentations, space for class-based learning and hands-on training), and to grow current programs. As another example, an administrator commented that students who are enrolled in a particular computer certification course need hands-on training in addition to the online course material. This administrator is exploring the possibility of installing a "tear-down lab" that would allow students the opportunity to rebuild computers. Clearly, this option entails significant space requirements.

IVc. Health Careers Education

As Table 1 indicates, approximately 8 percent of survey respondents (N=124) teach courses in health careers. This program area includes the following courses/occupation clusters:

- Introduction to Careers in Health Care
- Biotechnology Services
- Dental Services
- Diagnostic Services
- Health Care Information Services
- Medical Office Services
- Nursing Services
- Support Services
- Preventive Services
- Therapeutic Services

Survey respondents and focus group participants teach in a wide variety of health career areas, such as veterinary medicine, health fitness, and dental assisting. The most common courses taught by survey respondents include:

- Preparing to Work in Health Care (12 percent of respondents teach at the introductory level; 7 percent teach an advanced course)
- Sports Medicine (10 percent)
- Medical Assisting (9 percent)
- Biotechnical Services (9 percent)
- Dental Career Courses (9 percent)
- Exploring Health Care (8 percent)

The participants in focus groups/telephone interviews also reported teaching a variety of health career courses, including Hospital Community Health Services, Dental Careers (assisting and front office), Nursing Assistant, Hospital Careers, and Health Occupations.

Health Careers Education Scientific/Technical Equipment Needs

Survey data suggest that the need for scientific/technical equipment is even greater for health career teachers than the need to improve facilities or computer equipment. As Table 14 shows, only 27 percent of teachers reported that their scientific/technical equipment fully meets industry standards (compared to 32 percent of teachers reporting that computer equipment fully meets industry standards and 46 percent of teachers reporting that facilities fully meet industry standards).

Table 14. The Degree to Which Scientific/Technical Equipment Meets Industry Standards

Table 14 removed to reduce the size of file.

Teachers who reported that they had additional scientific/technical equipment needs (67 percent) were asked to list specific equipment they needed to meet industry standards. The list of needed items teachers cited is provided in Table 15.

Table 15. Additional Scientific/Technical Equipment Needed to Meet Industry Standards

Table 15 removed to reduce the size of file.

Overall, teacher focus group participants believed that the list above accurately represents the needs of teachers in health career courses. However, teachers in the dental field believed that the list does not reflect the needs in their programs. For example, dental teachers in the focus group repeatedly commented on the need for state-of-the-art dental chairs (which was mentioned only six times in the survey). As one teacher commented, "Teachers cannot train dental students properly without all the necessary features of a dental chair." Currently, she has four old chairs for 39 students. She explained, "Teachers go to government surplus warehouses to purchase dental chairs that were donated by government facilities . . . These dental chairs are about 35 years old and were probably donated because they are no longer up to industry standards." Other focus group teachers also voiced similar concerns about the inadequacies of donated equipment. One teacher, for example, commented, "I'm the step before [the equipment is sent to] the dumpster."

Administrators who participated in focus groups believe that much of the scientific/technical equipment needed for health career classes is simply too expensive for schools or programs to purchase. In one administrator focus group, for example, participants stated that health career programs are particularly costly to start up and maintain due to the need to abide by ever-changing state regulations and codes related to health care. In another administrator focus group, participants commented on the expense of items such as medical exam tables and EKG (electrocardiogram) machines, which are so costly that many ROCPs do not open such programs despite student interest and the definite need to train more health care professionals. As one administrator stated, "There is a definite need in the state — people are crying for more nurses and nursing assistants, but ROCPs do not have funding for new programs."

Both teachers and administrators who participated in focus groups reported the need for health career programs to rely heavily on health care partners (e.g., hospitals, dental offices) to provide students with at least some exposure to scientific/technical equipment. For example, one teacher commented, "I ask industry . . . to either borrow the equipment to bring to the classroom, or if that's not appropriate, then I schedule time to use it at the facility—instructional time with the specific students there."

In addition to needing additional scientific and technical equipment, teacher focus group participants also reported that their programs suffer due to a lack of basic supplies that are crucial for their courses.

Health Careers Education Computer Equipment Needs

Data gathered through surveys and focus groups suggest that Health Careers Education teachers need additional computer equipment to meet industry standards. As Table 16 shows, less than a third of teachers surveyed indicated that their computer equipment fully meets industry standards. Furthermore, when presented with a list of possible needs (e.g., central processing units [CPUs], printers), even fewer respondents (23 percent) stated that their needs for computer equipment were being met.

Table 16. The Degree to Which Computer Equipment Meets Industry Standards

Table 16 removed to reduce the size of file.

Overall, survey respondents indicated that their most pressing needs are for computers and printers. As Table 17 below shows, over a third of teachers stated that they need additional computer equipment. Approximately one-fourth of the respondents indicated the need for digital cameras, scanners, Internet access, and modems.

Table 17. Additional Computer Equipment Needed to Meet Industry Standards

Table 17 removed to reduce the size of file.

Teachers who participated in focus groups agreed with these survey results, stating that their greatest needs include computers and printers.

- **More computers:** Participants reported the need for more computers. One teacher, for example, has only two computers for 39 students and cannot use the school's computer lab since it is typically used all day by students in business or computer classes. Moreover, teachers reported that many of their students do not have computers at home, making access at school even more vital so that they can learn basic computer skills that are required even in entry-level positions. Even those teachers who have a sufficient number of computers report that the equipment is slow and outdated.

  Participants reported that having adequate computer equipment (and software) is crucial to meeting the needs of their students. Teachers want their students to have access at school to the types of equipment and software that they will see in the workplace, such as billing software for medical or dental offices. As one teacher stated, "I see the technological advances that are being made in health care, so students . . . need to . . . have that exposure to the different programs and the different types of applications of computer technology to be successful in their independent training sites." A teacher in the dental area concurred, stating that students are expected to have computer skills when they are placed in an internship since most dental offices are computerized and the internship supervisor does not typically have time to teach what are considered basic skills. Another teacher reported that a lack of computers makes it impossible to use the CD-ROM that comes with the textbooks, which, she stated, "is a loss because much of the content of the textbook package is on the disc, not in print. Therefore, students miss valuable content that is related to industry standards."

- **Improved technical support**: Teachers who work in schools that received Digital High School grants were more apt than other teachers to report that their computer equipment needs are being met. However, the grant recipients also state that technical support is often lacking, which has a direct impact on their ability to use their computer equipment.
- **Improved Internet access**: In addition to computers, teachers who participated in the focus groups also reported the need for Internet access. One teacher, for example, stated that only one computer out of ten has Internet access. Another commented that most of the health career facilities in her district do not have Internet access and consequently it is difficult for students to do field-related research.

Overall, administrators who participated in focus groups agreed with teachers about the need for additional computer equipment as well as for technical support, maintenance, and repair of existing equipment. Administrators also reiterated the need for adequate software related to the health care field, such as computer software to teach anatomy.

Health Careers Education Facility Needs

When asked on the teacher survey to indicate the degree to which the facilities for their specific course meet industry standards, almost half (46 percent) of respondents indicated that health career facilities "fully meet" industry standards, and 39 percent indicated that the facilities "almost meet" standards.

Table 18. The Degree to Which Facilities Meet Industry Standards

Table 18 removed to reduce the size of file.

However, when asked to identify instructional facility upgrades needed to adequately meet industry standards, only 27 percent of respondents stated that no upgrades were needed (see footnote 2 for a discussion about this apparent discrepancy).

Table 19 below provides a list of the facility upgrades that were most frequently identified by respondents as necessary to meet industry standards. As the table shows, over one-fourth of teachers indicated the need for additional space/square footage.

Table 19. Facility Upgrades Needed to Meet Industry Standards

Table 19 removed to reduce the size of file.

Focus group/interview participants in three out of four regions concurred with the views of the survey respondents, stating that space is the most pressing facility need and that it is crucial to accommodate the increased number of students (both in the school at large and in the health career courses) as well as large pieces of equipment. In the fourth region, participants believed that the health facilities in California are adequate.

In administrator focus groups, participants agreed that additional space is particularly important in the health careers area because of the need to store biohazardous material and computers.

Additionally, administrators mentioned the need for updated sewage and hot water systems.

IVd. Home Economics Careers and Technology

As indicated in Table 1 on page 7, the home economics survey responses accounted for 14 percent (N=214) of all survey responses. The Home Economics Careers and Technology program area covers a range of courses/occupational clusters, including:

- Child Development and Education
- Consumer Services
- Family and Human Services
- Fashion Design, Manufacturing, and Merchandising
- Food Science, Dietetics, and Nutrition
- Food Service and Hospitality
- Hospitality, Tourism, and Recreation
- Interior Design, Furnishings, and Maintenance

The survey and focus group/telephone interview participants teach in several cluster areas in home economics. The most frequently mentioned courses that respondents said they teach are:

- Food and Nutrition (13 percent of home economics respondents)
- Consumer Economics Comprehensive Course (11 percent)
- Food and Hospitality Services (10 percent)
- Child Care and Development (7 percent)
- Teaching Careers (7 percent)
- Food and Beverage Production and Preparation (6 percent)
- Articulated Child Development and Guidance (4 percent)
- Clothing and Textiles (4 percent)

Participants in the focus groups/telephone interviews also teach many of the courses mentioned above. In addition to these courses, focus group/interview participants also teach the following: Sample Making, Fashion, Culinary Arts, Psychology of Children, and Interior Design.

Home Economics Careers and Technology Scientific/Technical Equipment Needs

Except for computer equipment, the scientific/technical category includes all other equipment associated with home economics programs. Similar to other career areas, home economics programs are becoming more reliant on scientific/technical equipment that is based on rapidly changing technologies. As shown in Table 20, the survey data indicate that the majority of respondents (53 percent) believe that their scientific/technical equipment almost or fully meets industry standards, 26 percent think their equipment falls short or very short, and 21 percent either do not know or did not respond.

Table 20. The Degree to Which Scientific/Technical Equipment Meets Industry Standards

Table 20 removed to reduce the size of file.

Those who reported that they have additional scientific/technical equipment needs (54 percent) were asked to list the specific equipment types needed to meet industry standards. Table 21 highlights the most frequently mentioned scientific/technical equipment.

Table 21. Scientific/Technical Equipment Needs

Table 21 removed to reduce the size of file.

Generally, focus group/telephone interview participants agreed with the survey summary list of scientific/technical equipment needs and believe that it is consistent with the widespread needs of home economic programs across the state. There is, however, some concern that the list may be perceived as somewhat simplified and not representative of the technology-related equipment that is now considered industry standard. This issue and other findings from the focus groups/telephone interviews are described below.

- **Technology-enhanced equipment:** Although most focus group teachers agreed the list generally represents the needs across the state, they also expressed a desire to focus on obtaining new technology-related equipment that is used in the industry. For example, computer-controlled sewing machines are now industry standard, yet most classes are still using machines that are 30 to 35 years old. Teachers acknowledged that computerized equipment costs significantly more than traditional machines; however, they insisted that it is important to have enough modern equipment so that students get exposure to the types of equipment they may find in industry. However, they do not think it feasible or necessary to provide each student with their own technology-enhanced equipment. For example, one teacher mentioned that for so many years teachers have learned to get along with what they have, and this makes it difficult to think about what is needed to operate an industry-standard program. She agreed that her program does not need new equipment every year but stressed the need for equipment in order to meet twenty-first century standards. Having modern equipment, such as digitally operated equipment, would help expose students to what they will find in industry settings.
- **Commercial-grade kitchen equipment:** Although elements of a commercial kitchen are included in Table 21, participants believe that the overarching need is to outfit food service and culinary arts programs with commercial kitchens. This type of equipment is costly but, according to teachers in the food service clusters, necessary to prepare students for what they will find in industry. For example, one teacher commented that anything commercial requires a higher quality of equipment.
- **Providing enough equipment exposure to students**: Relating to the points made above, participants believe it is crucial to ensure that students get exposure to the types of equipment that they will likely encounter upon entering the industry. Given the current gap between the equipment that programs currently have and that which is used in the industry, the exposure issue is of particular concern in this area.

Home Economics Careers and Technology Computer Equipment Needs

Computers are now used in nearly every home economics cluster area. Although most home economics programs have at least some computers and related equipment, the data suggest that the need for additional computer equipment that is capable of running relevant software programs (which often define the industry standard) is growing. Both the survey and focus group/telephone interview data indicate this growing need. Table 22 indicates the degree to which teachers believe their current computer equipment meets industry standards (based on survey data). As shown, 26 percent of respondents think that their computer equipment fully meets industry standards, and 36 percent think that their equipment almost meets industry standards.

Table 22. The Degree to Which Computer Equipment Meets Industry Standards

Table 22 removed to reduce the size of file.

However, when asked to indicate additional computer equipment needed to meet industry standards, only 17 percent selected "none." Similar to the question about facility needs, there is a slight discrepancy between the percentage of teachers (26 percent) who claim that their computer equipment fully meets industry standards and the percentage of teachers (17 percent) who claim they do not need any additional computer equipment (see footnote 2 for a discussion about the apparent discrepancy). Those who indicated that they need additional computer equipment to meet industry standards identified computers (and peripherals) most frequently, as indicated in Table 23.

Table 23. Additional Computer Equipment Needed to Meet Industry Standards

Table 23 removed to reduce the size of file.

Focus group/telephone interview participants agreed that the equipment in Table 23 is generally important to meeting industry standards. Participants also commented in more detail about the many different factors involved in determining needs (e.g., Digital High School grant funding, nature of program, relevant software) and provided additional insight into these needs, including the types and numbers of computer equipment that are required to meet the changing home economics industry clusters. These needs are outlined in more detail below.

- **More computers:** Nearly every participant expressed a need for more computers. This is particularly important now that so many of the home economics related careers require computer use of some type. Students need to do research on the Internet, create menus, and track inventory. In the food industry, for example, the flow of the product is tracked by computers—from ordering food to taking inventory. Thus, students need to do more work with computers and familiarize themselves with the different activities required by the industry.
- **Laptop computers:** Focus group participants expressed a desire to have laptop computers. There is some concern about space and where to put new computer stations, particularly because space is becoming even more limited. Laptops can be stored and moved using carts, which make them mobile and accessible to more students. Furthermore, laptops provide opportunities to work on computers in classrooms and do

not require students to go to the computer lab. In short, participants believed that laptops should be considered when equipping classrooms with more computers.

- **LCD projectors:** LCD projectors and related equipment was not one of the survey choices but was identified as important by participants. Nearly every focus group participant agreed that LCD projectors are becoming essential for both students and teachers. They are used for presentations and as instructional tools during class sessions. This equipment allows teachers to utilize demonstrations more efficiently and effectively.

Home Economics Careers and Technology Facility Needs

The data from surveys, focus groups, and telephone interviews all suggest that home economics teachers need facility upgrades to meet industry standards. Table 24 indicates the degree to which teacher survey respondents believe their current facilities meet industry standards. As shown, 26 percent believe their facilities meet industry standards, and 41 percent think their facilities almost meet industry standards.

Table 24. The Degree to Which Facilities Meet Industry Standards

Table 24 removed to reduce the size of file.

However, when asked to identify specific facility needs, only 15 percent selected "No upgrades are necessary," while 85 percent of respondents identified some specific facility need. This suggests that the facility needs are more pronounced than indicated by responses to the previous question on how well existing facilities meet industry standards (see footnote 2 for a discussion about the apparent discrepancy).

Table 25 lists the facility upgrades (either repairs and/or installation) most frequently identified as being necessary to meet industry standards. The specific facility needs are diverse and most likely reflect the wide range of home economics programs and the various conditions of school facilities across the state.

Table 25. Facility Upgrades Needed to Meet Industry Standards

Table 25 removed to reduce the size of file.

The focus group/telephone interview participants strongly supported the facility upgrades identified by the survey respondents. Although the needs expressed by teachers varied depending on the nature of their courses/career clusters, some common facility needs were identified across programs. For example, participants in all four regions consistently identified "more space" and "electrical outlets/power" as major facility needs. Specific details about these two major facility needs are provided below.

- **More facility space**: Nearly all teachers in the focus groups agreed that more space is essential in helping their programs to meet industry standards. For example, food service teachers need more storage space in order to properly store pots, pans, and pantry items. Given that the number of programs using commercial kitchens is increasing, storage

space is even more of a concern because of the increased volume of commercial equipment that needs to be stored properly.

- **Sharing classroom space**: Teachers expressed a concern that they are being forced to share their classroom space more frequently with other unrelated courses. This situation is often due to the increased pressure to offer more academic courses and the overcrowding of schools. In some cases the sharing "agreement" reduces the square footage of their class space (i.e., they split one room into two separate classes); in other cases it means that the room is used during prep periods to house an entirely different class. For example, a teacher who teaches in a year-round school shares her Sample Making class with another class (not related to sample making) during her off months. Although the incoming class does not use the equipment in her class, damage still occurs because students are cramped in the classroom and forced to work around the machines.
- **More electrical power**: Teachers consistently mentioned the need for more electrical power and outlets that are designed for commercial equipment. The electrical outlets are often not sufficient to run all the different equipment required by home economics programs. As one teacher commented, "Running all of the different power sources in your class becomes a juggling act. Circuits often go out if certain pieces of equipment are turned on."

IVe. Industrial and Technology Education

Industrial and Technology Education Sample/Background Information

As indicated in Table 1, 32 percent (N=502) of all survey respondents teach Industrial and Technology Education (ITE) courses. The ITE program area includes a broad range of clusters, including:

- Technology Core
- Construction Technology
- Drafting Technology
- Electronics Technology
- Engineering Technology
- Graphic Communications
- Manufacturing Technology
- Transportation and Energy Technology

The ITE program area includes approximately 120 different courses. The survey respondents teach in a variety of these cluster areas. The most frequently mentioned courses that respondents said they teach are:

- Automotives (9 percent of teachers)
- Computer Service Technology (7 percent)
- Woodworking (6 percent)
- Computer-Aided Drafting (6 percent)
- Graphic Communications (6 percent)

- Introduction to Construction (5 percent)
- Automotive Mechanics (5 percent)
- Electronics Technology (3 percent)
- Desktop Publishing (3 percent)

The remaining survey respondents teach a multitude of different courses across the different clusters. In addition, focus group/telephone interview participants represent different clusters and courses. In addition to those courses mentioned above, participants teach courses in General Metals, Architecture, Refrigeration/Air Conditioning, Machine Shop, Small Machines, Cable TV Installation, Production Technology, Commercial Photography, Broadcasting and Production, and Welding.

Industrial and Technology Education Scientific/Technical Equipment Needs

As Table 26 indicates, 21 percent of survey respondents reported that their scientific/technical equipment fully meets industry standards, and 33 percent agreed that their equipment almost meets industry standards.

Table 26. The Degree to Which Scientific/Technical Equipment Meets Industry Standards

Table 26 removed to reduce the size of file.

Teachers who reported that they had additional scientific/technical equipment needs (52 percent) were asked to name the specific equipment they needed to meet industry standards. The list of items teachers cited is provided in Table 27.

Table 27. Scientific/Technical Equipment Needs

Table 27 removed to reduce the size of file.

Focus group and interview participants generally agreed that the scientific/technical equipment identified by the survey respondents reflects the needs across the state. However, many participants agreed that the list does not reflect the many programs that have closed in recent years. Although this study primarily examines the needs of current career programs, this concern is significant enough to warrant mention. According to CBEDS course assignment information, the number of ITE sections in grades 9–12 declined by approximately 23 percent between the 1997-98 and 1999-00 school years (*2000-2004 California State Plan for Vocational and Technical Education* 2001). Participants painted an equally dismal picture and provided several explanations for the reduction in programs and courses: ITE teachers are not replaced when they retire, there is a lack of qualified ITE teachers, shop space is often converted to academic classroom space, and the emphasis on statewide testing has decreased the importance of ITE programs within districts. Teachers felt strongly that the significant decrease in ITE courses should be considered when assessing current ITE program needs.

Although participants generally agreed with the list of scientific/technical equipment needs identified by survey respondents, they underscored the need to update their equipment to match what is currently being used in industry. Many participants have the equipment listed but need updated models and new technologies to support updated equipment. To meet industry standards, participants agreed that students need the opportunity to interact with the equipment that is used in industry. Some additional thoughts from participants related to this theme are provided below.

- **Upgrading equipment to reflect changing technology**: Perhaps more than any other CTE program area, the ITE program has undergone a major technological shift in the past few years in the types of equipment required to meet industry standards. The industry now requires extensive use of computer-related equipment and other technologies to complete many tasks. For example, one teacher commented that his school's automotive program uses an outdated alignment rack while the industry now uses laser-alignment equipment. The same automotive program balances tires using the old style (bubble balance), whereas the industry now uses automated balancing equipment. There is a wide gap between the equipment currently used in the classroom and what is now used in industry. Although older equipment is helpful in providing students with a foundation, the industry's shift to technology-related machinery requires that students gain at least some exposure to these pieces. For example, a welding teacher uses 40-year-old welders in his class. He pointed out that most new welding companies rely on new technologies (inverter technology) and is concerned that his students will not be adequately prepared when they leave his program and enter the industry.
- **Central clearinghouse of scientific/technical equipment**: Presently, much of ITE equipment is either stored or disposed of because it is either no longer considered useful for a particular program or that program has been discontinued. Teachers suggested that a central clearinghouse for equipment could be established to help teachers identify potential equipment. As programs obtain new equipment, the discarded equipment could be made available to other programs. The clearinghouse would allow ITE teachers to tap into equipment that they may not have known existed.

Industrial and Technology Education Computer Equipment Needs

The ITE area includes a wide range of program areas—from graphic communications to construction programs. Similar to other CTE program areas, computers are now playing a larger role in many ITE programs than in the past. For example, computer-related equipment is now used to diagnose engine problems in the automotive industry. Furthermore, computer-numerical controlled (CNC) machinery is now used in the manufacture of products.

Table 28 indicates the degree to which ITE teachers believe that their current computer equipment meets industry standards. As shown, 32 percent of teachers believe that their computer equipment currently meets industry standards, and 40 percent believe that it almost meets industry standards.

Table 28. The Degree to Which Computer Equipment Meets Industry Standards

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However, when asked to identify the additional computer-related equipment necessary to meet industry standards, only 16 percent responded "none." Similar to the discussion about facility needs above, there is a discrepancy between the 32 percent who suggest that their needs are fully met and the 84 percent who indicated that they have additional computer equipment needs (see footnote 2 for a discussion about this apparent discrepancy). As shown in Table 29, ITE teachers selected computers most often (46 percent) when asked to identify their specific computer equipment needs.

Table 29. Additional Computer Equipment Needed to Meet Industry Standards

Table 29 removed to reduce the size of file.

Teachers and administrators who participated in the focus groups generally agreed with the needs identified by the survey respondents. Although computer needs vary by type of course, nearly all teachers and administrators agreed that programs need more computers—either new or upgraded computers. Related to computer use, participants talked about the need for software programs/applications that are currently used in industry (e.g., computer-aided drafting software). Participants stressed the importance of having up-to-date software programs, adequate computers on which to run the applications, and licensing agreements so that they can maximize their usage. Presented below is additional detail related to the need for more computers and software.

- **More computers**: Nearly every administrator and teacher who participated in the focus groups/telephone interviews expressed a need for more computers. Many participants acknowledged that the recent grant money (from the one-time equipment grant) helped in the purchase of computers; however, they agreed that the need continues due to the relatively short life span of computers. For example, a teacher commented that her PCs are outdated despite being only three years old. Computers are considered outdated when they no longer have the capacity to run current software programs/applications.

- **Updated software**: The need for more computers is directly related to the types of software required by different programs. Both administrators and teachers pointed out that ITE programs rely on specialized software. For example, drafting programs rely on Autocad, manufacturing programs rely on computer-automated manufacturing (CAM) and computer-numerical controlled (CNC) software, and graphic design programs use Photoshop™ and PageMaker™ programs. These software programs are essential to meet industry standards, and participants believed such needs could not be separated from the need for more computers and related equipment. They believed strongly that computer and software purchasing decisions should be made simultaneously.

Industrial and Technology Education Facility Needs

Both the survey and focus group/interview data suggest that ITE programs need facility upgrades in order to meet industry standards. Table 30 indicates the degree to which ITE teacher survey respondents believe their current facilities meet industry standards. As shown, 32 percent believe their facilities meet industry standards, and 39 percent believe their facilities almost meet industry standards.

Table 30. The Degree to Which Facilities Meet Industry Standards

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Despite the large percentage of respondents who believe that their facilities meet or almost meet industry standards, only 19 percent selected "No upgrades are needed" when asked to identify specific facility upgrades that are necessary to meet industry standards (see footnote 2 for a discussion about this apparent discrepancy). Table 31 highlights the facility upgrades (either repairs and/or installation) that were most frequently identified by the ITE respondents who indicated they had additional needs (81 percent).

Table 31. Facility Upgrades Needed to Meet Industry Standard

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The teachers and administrators who participated in focus groups/telephone interviews agreed with the facility needs identified by the survey respondents. The facility needs are somewhat varied due to the vastly different types of ITE programs across the state (e.g., commercial photography to cabinetmaking). However, despite the differences in programs, some common themes emerged from the survey and focus group participants. Specifically, participants agreed with the survey data about the need for more space, improved ventilation, and additional ergonomically designed furniture. These needs are discussed in more detail below.

- **More space:** Many ITE programs require large amounts of space to accommodate equipment and classroom/lecture space. Both teachers and administrators agreed that the large space often required by these courses makes them appealing for conversion to other classes. For example, one teacher mentioned that her production room was converted into another class because of overcrowding at her school. Another teacher mentioned that he would like to use the old woodshop at his school for a new woods class as it has dust collectors and other equipment already installed; however, the shop has already been converted to a computer lab. Participants often expressed a desire to have the space that had been taken from them to be returned or replaced.

  Another reason that teachers and administrators stressed the need for more space is due to the increased reliance on computer use in many ITE programs. Many ITE programs that did not previously rely on computer-related technologies now require students to use both computers and scientific/technical equipment. As such, these programs need space for the computers as well as the lab or shop space. Although installing a new computer lab for each shop may not be feasible or necessary, additional storage space is needed to properly store computer equipment in a clean environment.

- **Improved ventilation systems:** Many participants discussed the need for improved exhaust/ventilation systems. Although some teachers expressed a need for cleaning their ventilation systems, others talked about the need for entirely new systems. One teacher commented that the ventilation system is adequate for students in his welding course(s) because they spend only an hour or two a day in the class; however, he does not believe that the system is good for his own health given the amount of time he spends in the class. Administrators added that the codes and regulations related to ventilation systems/usage in schools are continually changing and that teachers may not be familiar with current requirements.
- **Ergonomically designed furniture:** Many ITE programs rely on computers and related equipment. As such, the need for ergonomically designed furniture was identified by both survey and focus group/telephone interview participants as a need across ITE programs, particularly those programs where students spend a significant amount of time using computers, including desktop publishing and graphic design programs (see computer equipment needs below).

Summary of Program-Specific Findings

The program specific findings suggest that California's CTE programs are facing widespread facility and equipment needs. Teachers strongly believe that additional facility and equipment upgrades are required to meet industry standards. Moreover, this view was strongly supported by the administrators and teachers who participated in the focus groups/telephone interviews.

V. Cross Program-Area Findings

Although the primary purpose of this study was to determine the needs for scientific/technical equipment, computer equipment, and facilities in particular CTE program areas, the study also elicited additional findings related to all CTE program areas. Specifically, the study yielded key information related to the importance of professional development opportunities, the desire for stronger education/business partnerships, the impact of high-stakes testing on CTE courses, and the many factors that determine the pricing of equipment and facilities.

Professional Development

Survey respondents and focus group participants agreed that CTE teachers need more professional development opportunities. When asked to identify potential enhancements for CTE courses, 78 percent of all respondents reported that additional professional development opportunities are critically important or important to maintain or elevate their courses to meet industry standards (as indicated in Table 32).

Table 32. Percentage of Survey Respondents Indicating the Importance of Additional Professional Development Opportunities

Table 32 removed to reduce the size of file.

Survey respondents were asked to identify specific areas of professional development necessary to more effectively teach their CTE course(s). As shown in Table 33, between 19 percent and 44 percent of teachers in all five CTE program areas indicated professional development needs in all seven areas. Agriculture, Business, and Industrial and Technology Education teachers most frequently indicated that they need professional development in establishing community/school partnerships; Health and Home Economics teachers most frequently indicated needing professional development in integrating technology into the program or curricula. Few teachers (between 6 percent and 13 percent across program areas) indicated that they did *not* need any professional development.

Table 33. Percentage of Teacher Survey Respondents Who Indicated Specific Professional Development Needs

Table 33 removed to reduce the size of file.

Focus group participants agreed with the survey respondents about the need for more professional development. Specifically, participants stressed the need for professional development related to newly purchased equipment and technologies and for ongoing technical support and training. This training is particularly important due to the rapidly changing nature of CTE equipment and technologies. The administrators repeatedly mentioned that such training is necessary to maximize the benefit of the equipment. In fact, they found it difficult to separate the need for this type of training from the need for the equipment, stating that the equipment is only as effective as the teachers who are using it in their classes.

Additionally, focus group participants suggested that professional development related to understanding current industry standards is necessary. Participants noted that industries are changing rapidly and thus the expectations for what students should know and be able to do are changing as well. For example, in a focus group with agriculture teachers, several participants indicated the importance of a Global Positioning System device while commenting that some of their colleagues are unaware of its importance in meeting industry standards.

Education–Business Partnership Activities

Not surprisingly, an important component of CTE involves establishing and maintaining strong ties to the business community. Historically, businesses throughout California have offered schools many different types of assistance, including donating equipment and supplies, working with students and teachers, providing ideas on curricula, and allowing schools and teachers to use their facilities.

On the teacher survey, respondents were asked to rate the importance of various types of education–business activities on a five-point scale (critically important, important, slightly important, not important, and do not know). Table 34 indicates different types of education–business activities and the percentage of respondents who believe that the activities are critically important or important to meeting industry standards. As shown, the majority of teachers responding to the survey in each career area consider most education–business partnership activities critically important or important.

Table 34. Percentage of Survey Respondents Who Rated the Specific Education–Business Partnership Activities as "Critically important" or "Important"

Table 34 removed to reduce the size of file.

Focus group participants also agreed that business–education partnerships are important for CTE programs. They repeatedly emphasized that they value the assistance provided by businesses and are deeply appreciative of this support. Participants mentioned that businesses play a key role in providing valuable ideas to CTE programs through advisory committees, internship opportunities, and the use of facilities. In many locations CTE programs rely heavily on business involvement to provide adequate instructional opportunities. As was indicated in survey data, many focus group participants reported that using off-site facilities is crucial to their programs. For example, Health Careers Education teachers stated that because of the cost of many types of medical and dental equipment, much of their instruction on the use of certain equipment takes place at a medical or dental facility rather than at school.

Focus group participants, however, were less positive about the impact businesses have on providing scientific/technical and computer equipment. Administrator participants, for example, mentioned that they cannot rely on local businesses to take care of any substantial equipment needs or to help fund new programs. Often equipment that is donated does not meet industry standards. Many teachers and administrators share the opinion that industry contributions of equipment to schools serve as "one step before the dump." For example, schools and ROCPs are often the recipients of the same dated computer equipment (e.g., Pentium 1's) that the programs are trying to replace. However, programs are sometimes hesitant to reject dated equipment and risk discouraging further donations from local businesses. Also, these programs point to the possibility of finding a few useful pieces of equipment among a total load of otherwise dated donated equipment.

Some notable factors determine the amount of support CTE programs receive from businesses. Participants agreed that teachers who have experience working in industry or who have built relationships with business–industry naturally receive more support from businesses. Both administrators and teachers expressed a concern that when they retire, new teachers will not have the long-established contacts that are essential to ensure support from businesses. Another important factor that determines the level of business support is the type of CTE course/program. Some CTE courses/program are more amenable to education–business partnerships. For example, administrators in one focus group reported that placing students in internships is relatively easy in the banking, food service, and retail industries. In comparison, providing students studying automotive technology with work experience is more difficult mostly due to liability concerns. Automotive students often need extensive experience with specialized machinery before being placed in an internship.

Although the level of support from local business varies widely across programs and regions, what is consistent across teachers and administrators in different programs is the perceived need for more business support.

High-Stakes Testing

A pervasive theme echoed by teachers and administrators in focus groups across the state is that the emphasis on high-stakes testing and accountability in California schools means CTE and other elective courses receive little attention and resources. For example, some students are discouraged from taking CTE courses and are directed to academic remediation classes to help them perform better on high-stakes examinations. Similarly, teachers and administrators report that available space in schools is often given to academic remediation classes rather than to the more specialized CTE classes. In such an environment, it is difficult for CTE administrators and teachers to successfully advocate additional equipment and facilities regardless of the degree of need.

Equipment and Facilities Pricing

A consistent finding across program areas was that a multitude of factors influence the cost of equipment and facility needs. To gather cost estimates for the identified equipment and facility needs, WestEd solicited feedback from teachers, administrators, technology professionals, and school facility construction personnel through interviews and focus groups.

The major factors affecting the price of computer and scientific/technical equipment are product quality, name brand, product capacity, intended use, warranty options, durability, purchasing agreements, quantity purchased, and market demand. In comparison, the pricing of facilities is affected by geographic location, bidding climate, site factors, and the amount of structural and/or architectural modifications needed to upgrade facilities.

The data compiled from the focus groups and interviews were used to construct an overview of computer and facility costs associated with the operation of CTE programs. Because many factors influence the cost of equipment and facilities, the data are presented in ranges that reflect upper and lower price parameters. Costs estimates are presented in Appendixes C through E.

VI. Conclusions and Implications

The findings of the study are provided in this section.

Conclusions

What do the major findings from this study say about the status of CTE programs in California and their current facility and equipment needs?

The general conclusion of this study is that California's CTE programs are facing widespread needs for equipment and facility upgrades to effectively prepare students for career entry and postsecondary opportunities.

This conclusion is supported by the consistency of findings within and across program areas concerning the nature and extent of these facility and equipment needs. Several common themes emerged from the data gleaned from teacher surveys and teacher and administrator focus groups/telephone interviews across programmatic areas and are offered below.

Teachers are not accustomed to asking for equipment and facilities that meet industry standards; instead, they typically focus on the basics needed to simply maintain and run their classrooms and programs. Perhaps the most contradictory but consistent finding is that although a substantial proportion of teachers (i.e., 50 percent or more within each program area) responded to the teacher survey that their equipment and facilities meet or almost meet industry standards, these same respondents identified several necessary equipment and facility upgrades. How can a given program meet industry standards for quality equipment and facilities yet still obtain substantial numbers and types of facility and equipment upgrades? There are several possible reasons for this apparent contradiction.

First, there is some indication from the focus groups that teachers are not sure what constitutes industry standards. Thus, many survey respondents may genuinely believe that their programs are not far from meeting industry standards yet also believe that their programs need substantial facility and equipment upgrades. On the other hand, as administrators in the focus groups suggested, many CTE teachers are advocates of their programs and are accustomed to defending their programs by reporting that their programs meet industry standards even in the face of conflicting information.

Finally, the survey format may have limited respondents' ability to clarify or revisit their responses to certain questions about facility and equipment needs. Thus, their answers to later questions on the survey may be inconsistent with their answers to questions presented earlier in the survey. For example, some survey respondents indicated that they had few equipment needs in early survey questions. However, when presented later in the survey with a list of possible equipment upgrades (that presumably triggered their memories), these same respondents indicated that their programs do need many of these upgrades. Interestingly, the teacher focus groups—which did provide teachers with a forum for clarifying, revisiting, and expanding their survey responses—painted a more nuanced but dire picture of program equipment and facility needs than the teacher survey results.

CTE facilities are inadequate; space for specialized facilities is at a premium. Across all programs, space is needed for specialized facilities, whether for an industrial kitchen for Home Economics Careers and Technology programs or for secure storage of biohazardous materials for Health Careers Education programs. Unfortunately, teachers and administrators report very limited opportunities and funding to sufficiently upgrade existing facilities or to build particular facilities for new programs. Many programs report having to make do with what they have or with what they can take. That is, they convert gyms, weight rooms, storage rooms, and regular classrooms to make space for their program facilities. Although not adequate to meet industry standards, this "make-do" strategy is often the only real option for many programs.

Computer equipment needs are widespread. Substantial numbers of teachers and administrators in all program areas report that they need more computer equipment. Although many CTE classes have access to computer labs at their schools, many teachers note that the access is typically limited and that the equipment in these labs is inadequate. Moreover, teachers also report that their specialized computer hardware needs cannot be meaningfully distinguished from their software needs. For example, both LCD equipment and CD software are needed to effectively teach anatomy in Health Careers Education programs. Finally, both teachers and administrators seem to realize the many challenges of meeting computer hardware and software needs. Specifically, they note the fast pace at which computers and computer equipment become outdated. Furthermore, most districts do not have a replacement policy for computers and related equipment. Lack of a policy results in inconsistent upgrades and makes it difficult to undertake effective long-term planning or systematically address hardware and software needs. Given these significant challenges, administrators recommend establishing explicit equipment replacement policies, and more specifically, a model whereby schools and ROCPs lease, rather than purchase, computer equipment.

Changing technology makes it difficult, if not impossible, to have equipment and facilities that meet industry standards. Because technology is changing at a rapid rate, industry standards represent a moving target. As such, many teachers and administrators across programmatic areas say that a realistic goal is to provide their students with exposure to, rather than intimate familiarity with, the types of equipment and facilities that they are bound to face in industry. This means that instead of striving to obtain up-to-date equipment and facilities for every CTE student's own extended use, teachers and administrators hope to secure only sufficient *access* to up-to-date equipment and facilities so each student can take a turn.

Professional development and technical support are greatly needed by teachers. Although the professional development needs of CTE teachers vary based on different factors (e.g., CTE program area, district requirements, teaching experience), the findings strongly suggest that teachers need ongoing professional development to fully understand current industry standards for equipment and facilities. They also need professional development so that they can develop a better understanding of the different types of industry-standard equipment that are currently in use, as well as how to operate them, in order to maximize their benefit. Finally, teachers and programs need ongoing technical support (e.g., computer network support) to make maximum use of any new lab facilities or computer or technical equipment.

Support from local businesses is variable, and programs need more extensive and consistent support. Although support from local business varies across programs and regions, what is consistent across teachers and administrators in different programs is the perceived need or desire for more business support. Teachers and administrators generally agree that although businesses provide important guidance and advice related to the industry (e.g., labor market information, skills necessary for the industry), they provide very little support in terms of actual equipment. Equipment support is not broadly based and is often the result of one or two motivated, well-connected teachers soliciting a few local businesses. Participants acknowledge that businesses may be somewhat limited in what they can provide due to financial constraints, but they agree that additional equipment would positively affect CTE programs.

The focus on high-stakes testing results has put pressure on electives, such as CTE courses. As part of the movement to hold educational systems accountable through statewide testing, districts are offering more academic courses and fewer electives and CTE courses. The report of the Superintendent's Task Force on Industrial and Technology Education (2001) indicates that all but one CTE program area (Health Careers Education) offered a reduced number of courses between the 1997-98 and 1999-00 school years. ITE and Business programs experienced the greatest decrease in the number of courses, 23 percent and 22 percent, respectively. Because of the number of recent CTE course closures, teachers and administrators find it difficult to advocate additional equipment, particularly when they are preoccupied with trying to retain their current courses.

Differences in programmatic focus and emphasis make it difficult to precisely define the nature and costs associated with facility and equipment needs in California. With the possible exception of Agriculture Education, most CTE programs in California do not adhere to a common statewide curriculum. Courses that are nominally the same may offer a wide variety of course content that requires very different kinds of equipment and facilities. Similarly, the findings reveal a wide diversity in the perceived programmatic objectives of CTE. At one end of the spectrum, teachers see the role of CTE as providing students with generic workplace readiness skills; others see their role as providing students with the specific skills needed for a particular career or job.

Finally, although determining the equipment and facilities needed in a specific locale to support a specific program is relatively straightforward, the diversity of local conditions makes it extremely difficult to generalize and quantify the needs beyond the local context. The quality and number of existing equipment and facilities, the employment opportunities, and level of community and business support vary by district. Costs, especially space-related costs, also vary by locale.

In summary, California's CTE facility and equipment needs vary widely, even within common programs and courses. Therefore, facility and equipment-related funding decisions need to be flexible enough to provide support that can be tailored to local conditions. A "one-size-fits-all" approach to funding equipment and facilities-related needs is likely to be ineffective.

Implications

The implications from this study are far reaching. The facility and equipment needs identified in this study, while extensive, cannot be isolated from an array of other issues to which they are intimately connected. Equipment and facilities needs must be addressed systematically in the context of a comprehensive approach to CTE.

Facility and equipment needs go hand in hand with other instructional needs. Equipment is usually not funded as a separate line item but is combined with instructional materials and course supplies. Therefore, considering equipment needs apart from these other expenses is not really possible. In addition, the close relationships between computers and software, between software and instructional materials, and between computers and other automated equipment further connects the assessment of computer equipment needs to these other cost considerations. Regardless of whether the needs are for equipment and facilities rather than other instructional support materials, teachers reported that their programs are funded annually. They asserted that so-called "five-year plans" are little more than wish lists since funds are not set aside to support the plans beyond the current fiscal year. Because an annual funding cycle may impose limitations on long-range planning, reserve accounts may be helpful in establishing set-aside funds to purchase equipment and related instructional materials. These reserve accounts would provide programs with more financial stability and help ensure that their equipment and instructional needs are met over an extended period of time.

The level of staffing directly affects the kind and amount of facilities and technical equipment available to programs. The focus group data suggested that, in some cases, additional access to needed equipment could be obtained through partnerships with local businesses if teachers, in particular, had the time available to forge and foster those relationships. Another personnel issue that relates to support for CTE programs is the difficulty of finding qualified teachers to teach many of the classes. Some programs have been discontinued because there were no qualified personnel to teach CTE classes. People with the skills and qualifications needed to teach many of the CTE classes can usually find more financially lucrative careers in industry. The problem of identifying and securing support for adequate CTE equipment and facilities is exacerbated by the shortage of knowledgeable personnel.

A valid needs assessment must carefully distinguish between needs and wants, particularly when resources are limited. Teachers are not always the final authority on what they need. Often they are not well versed on available technology, nor are they up-to-date on current industry practices, standards, and regulations. When a teacher expresses a need for a particular piece of equipment, he or she is often proposing a solution to a specific pedagogical problem. Although the teacher's need is real, the most effective and/or cost-effective strategy may not be the one suggested by his or her specific equipment request. Although administrators may be in somewhat of a better position to comment on what is needed, their technological knowledge is often limited. Suggestions from industry and technology experts may be helpful in determining facility and equipment needs.

Recommendation for a Set of Best Practices

The findings from this study suggest that there is a need to develop a set of best practices—based on ideas from teachers, administrators, industry representatives, and technology and curriculum experts—to demonstrate cost-effective ways of providing facility and equipment support for CTE programs and coping with limited resources. The study provided initial insight into strategies for addressing facility and equipment needs cost-effectively, including using emerging technologies to ease equipment needs and selectively equipping new and old CTE programs.

The study suggests several areas where the use of new technology can supplant the need for costly equipment or reduce the volume of equipment needed. For example:

- Computer-based instruction could be used to deliver basic CTE course information (e.g., basic safety instruction), which would reduce strain on shop and lab time schedules.
- Computer-based instruction and/or Internet access could provide students with exposure to industry-standard equipment that is often too cost-prohibitive to place in a classroom.

The study also reveals several instances in which creative strategies for reworking traditional facilities could produce more effective programs at a reduced cost. For example, suppose a school wants to offer a woodshop program. To set up and equip a traditional woodshop that prepares students to work in the furniture-making industry may cost in excess of $100,000. This cost would be hard to justify, particularly if there are few local jobs in the furniture-making industry. However, to set up the woodshop to prepare students for carpentry and related jobs in the construction industry might cost a fraction of the cost of the traditional shop. This emphasis on construction over making furniture might also be more consistent with local job market opportunities for students. Equipping a shop to teach construction-related skills is an example of how rethinking traditional approaches to facilities can better serve the students and the community at a reduced cost. This case is but one example of a "best practice" strategy, which could well be implemented in other contexts.

Fully developing the principles cited earlier into a set of "best practices" for strategic use of technology and rethinking the traditional facility configurations and delivery systems should be incorporated into a comprehensive approach for supporting California's CTE programs. At the same time successful implementation of such "best practices" does not obviate the real and pressing need for substantial resources to upgrade the equipment and facilities for CTE programs so that students in California are adequately prepared for postsecondary education and career options.

Appendix A

Teacher Survey Results

Note: Teacher Survey Results were removed to reduce the size of the file

Appendix B

Focus Group/Telephone Interview Protocols

- **Administrator**
- **Agriculture Education**
- **Business Education**
- **Health Careers Education**
- **Home Economics Careers and Technology**
- **Industrial and Technology Education**

Note: Focus Group/Telephone Interview Protocols were removed to reduce the size of the file

Appendix C

Facility Pricing Estimates

Note: Facility Pricing Estimates were removed to reduce the size of the file

Appendix D

Computer Pricing Estimates

Note: Computer Pricing Estimates were removed to reduce the size of the file

Appendix E

Scientific/Technical Equipment Pricing Estimates

Note: Scientific/Technical Equipment Pricing Estimates were removed to reduce the size of the file

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